



Office de la Propriété
Intellectuelle
du Canada

Un organisme
d'Industrie Canada

Canadian
Intellectual Property
Office

An agency of
Industry Canada

CA 2406099 A1 2001/10/25

(21) 2 406 099

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(86) Date de dépôt PCT/PCT Filing Date: 2001/04/09
(87) Date publication PCT/PCT Publication Date: 2001/10/25
(85) Entrée phase nationale/National Entry: 2002/10/16
(86) N° demande PCT/PCT Application No.: US 2001/011575
(87) N° publication PCT/PCT Publication No.: 2001/079063
(30) Priorité/Priority: 2000/04/16 (09/549,072) US

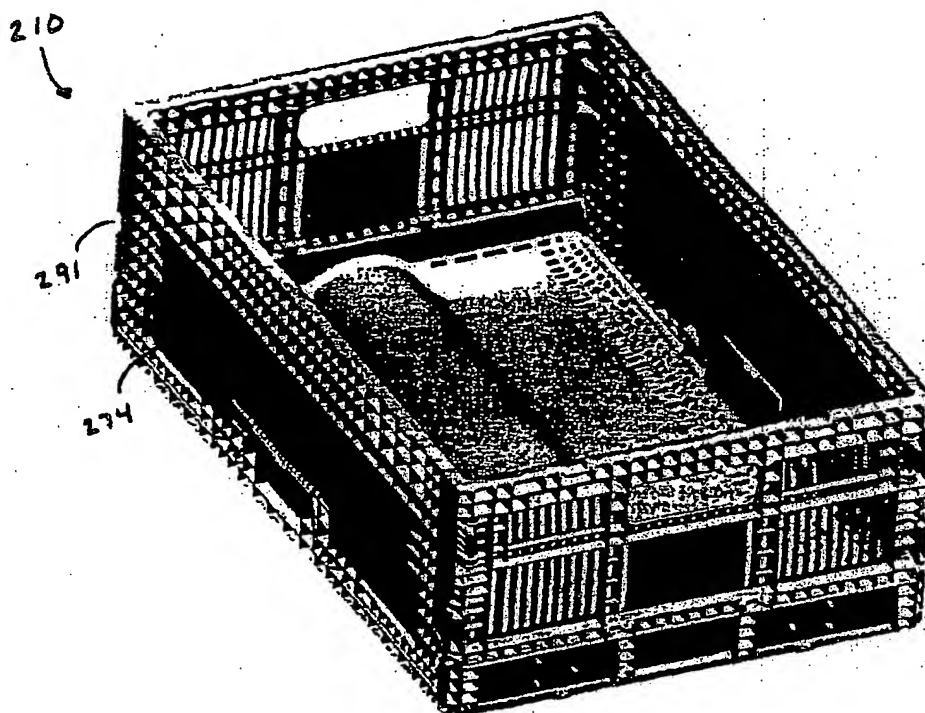
(51) Cl.Int.⁷/Int.Cl.⁷ B65D 6/16, B65D 6/18

(71) Demandeur/Applicant:
REHRIG PACIFIC COMPANY, US

(72) Inventeur/Inventor:
OVERHOLT, TRENTON M., US

(74) Agent: MACRAE & CO.

(54) Titre : RECIPIENT
(54) Title: CONTAINER



(57) Abrégé/Abstract:

A container (210) adapted for storing and transporting an item having a shape includes a flexible bottom panel (214) which has an upper surface upon which the item is supported, and a lower surface having a plurality of parallel, spaced apart ribs (316) with a relatively thin-walled section (318) between each adjacent pair of ribs. The flexible bottom panel (214) is adapted to conform to the shape of the item resting thereon.



(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
25 October 2001 (25.10.2001)

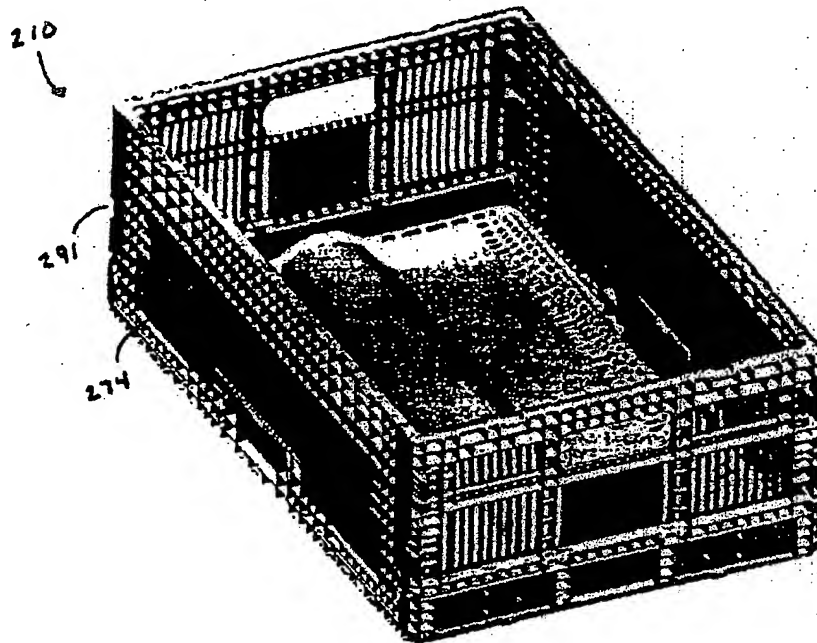
PCT

(10) International Publication Number
WO 01/79063 A1

- (51) International Patent Classification⁷: **B65D** (74) Agents: **DIAMOND, Konstantine, J. et al.**; Brooks & Kushman, 22nd floor, 1000 Town Center, Southfield, MI 48075 (US).
- (21) International Application Number: **PCT/US01/11575**
- (22) International Filing Date: **9 April 2001 (09.04.2001)** (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
09/549,072 16 April 2000 (16.04.2000) **US**
- (71) Applicant (*for all designated States except US*): **REHRIG PACIFIC COMPANY [US/US]**; 4010 East 26th Street, Los Angeles, CA 90023 (US).
- (72) Inventor; and
- (75) Inventor/Applicant (*for US only*): **OVERHOLT, Trenton, M. [US/US]**; 129 12th Street, Manhattan Beach, CA 90266 (US).
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report

[Continued on next page]

(54) Title: CONTAINER



(57) Abstract: A container (210) adapted for storing and transporting an item having a shape includes a flexible bottom panel (214) which has an upper surface upon which the item is supported, and a lower surface having a plurality of parallel, spaced apart ribs (316) with a relatively thin-walled section (318) between each adjacent pair of ribs. The flexible bottom panel (214) is adapted to conform to the shape of the item resting thereon.

WO 01/79063 A1

CONTAINER

TECHNICAL FIELD

This invention relates to a container adapted for storing, transporting, and displaying produce items and other goods.

5 BACKGROUND ART

Collapsible containers and crates are commonly used to transport and store a variety of items. Such crates are typically formed of injection molded plastic and are frequently adapted to receive perishable food items, such as produce. When assembled, such containers are rectangular in shape, and have a flat base surrounded
10 by four upstanding flat side panels which are joined to the flat base. When the containers are not in use, the collapsible feature of the containers allows the containers to be folded or otherwise reduced in size, thereby providing a desired compact size when storage space is minimal.

The base of the container is subject to a relatively large amount of
15 load when the container is filled and may frequently be lacking in the area of stability and strength. Because these containers often stack on top of others or may have other loads exerted on their upstanding panels, the side panels may also require enhanced strength. Typically, when a rectangular container is collapsed inwardly, first the long walls are collapsed and then the short walls are collapsed on top of the
20 long walls. Because there exists a gap between the short walls when folded, a container stacked thereupon is not fully supported in the area of the gap. Also, because one container rests upon the walls of another container, any transfer of top load forces is transferred through the walls, which may reduce the durability of the container. Other containers may fold the short walls first and the long walls second,
25 but this configuration requires a reduced long wall height, because for ideal nesting conditions with other containers, the long walls in this type of container should not overlap when folded.

Many containers also have a limited width or volume efficiency due to the way they are constructed, as well as due to their intended use. For example, produce such as bananas may require special handling because of their shape and as well as their capacity to be bruised. Unfortunately, the same containers used to transport produce such as bananas are also used to transport other non-perishable objects. Accordingly, in some instances, such produce may be subject to less than ideal handling and transport conditions. Further, while bananas are often shipped in the "hands down" orientation, retailers often display bananas in a "hands up" orientation, thus requiring additional handling of the bananas by the retailer upon receipt to place them in the desired orientation.

The improved container should provide produce, such as bananas and other delicate or perishable items, with handling that accounts for the shape and other properties of the items. The container should also provide for the maximum possible width or cubic volume efficiency. The container should also require less handling of the items upon delivery to the retailer.

DISCLOSURE OF INVENTION

It is an object according to the present invention to provide a collapsible display container which is cost effective to manufacture and efficient to assemble.

Further, it is another object according to the present invention to provide a collapsible display container which is capable of nesting with the like containers when in a collapsed position, and is also capable of stacking with like containers when in the assembled position.

It is another object according to the present invention to provide a container that has a bottom which is robust and has a design which is sufficiently able to support the load placed therein.

Another object according to the present invention is to provide a container to accommodate produce, such as bananas, and other items which have a natural shape or are delicate. It is also an object to present the items in a display-ready orientation upon arrival at the retailer. It is still another object to provide a
5 container having the maximum volume efficiency for its size and dimensions.

In carrying out the above objects, features and advantages according to the present invention, provided is a collapsible container including a base having a first pair of opposed upstanding members and a second pair of opposed upstanding members, and also including a first pair of opposed side walls each pivotably
10 attached to the base and orientable between an assembled position and a second position. Each of the first pair of opposed side walls has a recess which mates with and receives a corresponding one of the first pair of opposed upstanding members when in the assembled position. The container further receives a second pair of
15 opposed side walls each pivotably attached to a corresponding one of the second pair of opposed upstanding members and also orientable between an assembled position and a second position. The base includes a first and second pair of opposed edges to which the first pair of opposed side walls and the second pair of opposed side walls are pivotably attached to a corresponding edge. When the first and second
20 pair of opposed side walls are oriented in the second position, they are oriented in one of an inwardly folded orientation and an outwardly folded orientation.

Further disclosed according to the present invention is a flexible platform which is adapted to support an object. The platform includes a member which has an upper surface upon which the object is supported, and also a lower surface which has a plurality of parallel, spaced apart ribs. Between each adjacent
25 pair of ribs is a relatively thin-walled section defining a series of living hinges which allow the platform to conform to the shape of the object. In accordance with the invention, the platform is incorporated into a container. The platform defines a flexible bottom panel which has an upper surface upon which the item is supported. The panel also has a lower surface having a plurality of parallel, spaced apart ribs
30 and a relatively thin-walled section disposed between each adjacent pair of ribs. The flexible bottom panel is adapted to conform to the shape of the item resting thereon.

In yet another embodiment, the container has a first pair of side walls, which each include a relatively large central portion having a solid construction which extends outwardly beyond the plane defined by the corresponding side wall. Thus, this feature provides for a more volume-efficient container.

5

The above objects and other objects, features, and advantages of the present invention are readily apparent from the following detailed description of the best mode for carrying out the invention when taken in connection with the accompanying drawings.

10

BRIEF DESCRIPTION OF DRAWINGS

FIGURE 1a illustrates a first perspective view of a first embodiment of a container according to the present invention;

FIGURE 1b illustrates a perspective view of the first embodiment of the container shown in Figure 1a, the container having a side wall and an end wall folded down in the outwardly collapsed orientation;

15

FIGURE 1c illustrates an alternate perspective view of the first embodiment of the container;

FIGURE 2 illustrates an alternate perspective view of the first embodiment of the container;

20

FIGURE 3 is a bottom perspective view of the first embodiment of the container shown in Figure 2;

FIGURE 4 is a side elevational view of the first embodiment of the container;

FIGURE 5 is an end elevational view of the first embodiment of the container;

25

FIGURE 6 is a top plan view of the first embodiment of the container;
FIGURE 7 is a bottom plan view of the first embodiment of the container;

FIGURE 8 is a cross-sectional view taken across the transverse centerline of the base of the first embodiment of the container;

30

FIGURE 9 is a partial top perspective view of the base of the first embodiment;

FIGURE 10 is a partial bottom perspective view of the base of the first embodiment of Figure 9;

5 FIGURE 11 is a first perspective view of a flexible base design according to the present invention, having goods positioned thereon, specifically produce or perishable goods, and more specifically bananas;

FIGURE 12 is a second perspective view of the flexible base design of Figure 11;

10 FIGURE 13 is a side elevational view of the flexible base of Figures 11 and 12;

FIGURE 14 is a cross-sectional view of a second embodiment of a container according to the present invention incorporating the flexible base therein; and

15 FIGURE 15 is a perspective view of another container according to the present invention oriented in an assembled orientation.

BEST MODE FOR CARRYING OUT THE INVENTION

With reference to Figure 1a of the drawings, illustrated therein is collapsible container 210 according to the present invention in an assembled orientation or state. The components of container 210 are typically formed of various types of plastic or polymeric material by an injection molding or other plastic molding process suitable to this application. Container 210 may be used for the storage and transport of goods, and may also be referred to as a collapsible crate. While container 210 is suited for many uses, container 210 is particularly suitable for storing and transporting produce such as fruits and vegetables, where circulation of air and/or refrigerated gas is necessary to keep the produce fresh and consumable while it reaches the market. This circulation is fostered through the plurality of apertures and other openings provided in base 212 and walls 228, 230, 232, 234 over the entire container 210. Container 210 is generally symmetrical around both its longitudinal and transverse centerlines.

20
25
30

Container 210 includes a base member 212 having a bottom panel 214 which serves as the lower support for the container. Base 212 is best illustrated in the bottom perspective view of Figure 3. As is best shown in the top plan view of Figure 6 and bottom plan view of Figure 7, bottom panel 214 is generally rectangular in shape. With further reference to Figure 2, bottom panel 214 has four edges -- namely, a pair of opposed side edges 216 and 218, and a pair of opposed end edges 220 and 222. Base 212 further includes a pair of integrally molded opposed upstanding flanges 224 and 226 (or base walls) oriented perpendicular to bottom panel 14, each defining an upper end edge 225, 227, respectively. As is well understood in the art, the wall thickness of each of the walls and components illustrated and disclosed herein may vary depending on the intended usage and other characteristics desired from container 210.

As further illustrated in Figure 2, base 212 also includes another pair of opposed upstanding members 270 and 272, which are integrally formed with bottom panel 214 at pair of opposed side edges 220, 222. While members 270, 272 are shown as having a substantially trapezoidal shape, it is contemplated that any number of shapes may be applicable and feasible according to the teachings of the present invention. Preferably, upstanding members 270, 272 are centrally located along the length of side edges 220, 222. Members 270, 272 provide additional structural and torsional stability to container 210 when in the assembled orientation of Figure 1. Members 270, 272 also provide structural stability to one or more containers 210 which are nested (or stacked) together when in the inwardly folded position.

As shown in Figure 2 a first pair of opposed side walls 228, 230 are disposed opposite each other across bottom panel 14, and a second pair of opposed side walls 232, 234 are disposed opposite each other. When in the assembled orientation of Figure 1, first and second pairs of opposed side walls and base 212 define a compartment for storing goods therein.

Shown in association with the walls of Figures 4 and 5, are the hinging systems 280 (for side walls 228, 230) and 290 (for end walls 232, 234).

Further included in container 210 is a locking or latching system for latching side walls (228, 230) together with end walls (232, 234) to achieve the desired stability when container 210 is oriented in the assembled orientation.

5 As illustrated in Figures 1a,b,c - Figure 5, side walls 228,230 include outwardly directed central portions 274,276 which are bowed outward having an arcuate shape while end walls 232,234 include outwardly directed central portions 275,277 having an arcuate shape. As noted in Figure 1b, sidewalls 228, 230 and end walls 232, 234 are capable of collapsing in one of the outwardly and inwardly folded orientations. The bowed features of the side and end walls generally serve to
10 increase the interior volume of the container, thereby allowing the containers to store and transport more product.

In a preferred embodiment, the embodiment of container 210 according to the present invention and shown in Figures 1a-10 preferably incorporates a three-line base design for accommodating three rows of bananas.
15 Base 212 of container 210 has at least one curved portion formed therein. Particularly with reference to Figures 1a, 1b, 2, 8 and 9, the base 212 of the three-line design includes at least one curved portion (shown as a single curved portion 241) which is bowed upward as a symmetrical hump or arch portion down the centerline of base 212. As previously disclosed, curved portion 241 serves to
20 complement the natural geometry and inner profile of a bunch of bananas which are in a "hands down" orientation, best shown in Figure 9 (which is opposite the banana orientation shown in Figures 11-14 herein). Accordingly, curved portion 241 allows for a more cube (volume) efficient storage and transport of bananas in container 210 having predetermined dimensions.

25 With reference to Figures 3, 6, 7, and 9, curved portion 241 extends between edges 216 and 218 of base 212. This curved portion 241 is illustrated as wave-like or sinusoidal and is disposed in the central portion of bottom panel 214. Curved portion 241 of bottom panel 214 also serves to add stability to container 210 and augment the life of the container. Thus, for this three-line design, the first line
30 of bananas (or banana bunches) is positioned in its natural "hands down" on curved

portion 241 (see Figure 9), while each of the remaining two lines of bananas 300 are oriented "hands down" on either side of curved portion 241. In each of the curved portions 241 and 243 of base 212 is adapted to accommodate a line of banana bunches in the "hands down" orientation.

5 Referring again to the Figures 1a, 1b, 1c - 4, it is noted that unlike the first and second embodiments previously disclosed according to the present invention, the embodiment of container 210 has large portions 274, 276, 275, 277 which are formed in side walls 228,230 and end walls 232,234 which are preferably solid and do not have slots or other openings formed therein. As previously
10 mentioned, these large portions 274, 276 are outwardly directed, beyond the plane defined by each corresponding side wall. Portions 274, 276 serve as the point of contact for bananas (or other goods) on side walls 228,230. Therefore, the solid and continuous construction of these portions of side walls 228,230 and end walls 232,234 reduces the surface area of container 210 which is otherwise capable of
15 submitting an opposite reactive force against the bananas (or other goods) when positioned in container 210.

Solid portions 274, 276, 275, and 277 (shown in Figures 1b and 1c as relatively large rectangular portions) are also designed to provide container 210 with a maximum width at those portions, thus providing a maximum and efficient
20 container 210 volume. The width at these solid (or continuous) portions 274, 276 may be extended farther than other designs, as a result of the solid portions providing a stronger container construction having a greater sidewall integrity. Thus, solid portions 274-277 of the container walls are may be bowed further outward than in other embodiments.

25 Moreover, in comparison with the embodiment shown in Figure 15 disclosed herein, portions 274, 276 of container 210 do not include the cross-ribbing. The embodiment (10) having side walls (28, 30) with openings formed therein use cross-ribbing to provide for sidewall strength in addition to providing a means of cross-stacking the containers when in the collapsed orientation. Thus, cross-ribbing

is not required in the embodiment of container 210, in light of the structure of portions 274, 276.

Referring now to Figures 11 - 14, illustrated is a flexible base design that may be incorporated into the aforementioned container embodiments 10, 210, as the base (or bottom panel) of choice. Particularly, flexible base 310 may be used to form bases 12, 212 of various container embodiments. Flexible base 310 may particularly be used to form the bottom panel 214 of the previous embodiments. Flexible base 310 as illustrated includes an upper surface 312 and a lower surface 314. As shown in Figures 11 - 13, a bunch of bananas 300 rest upon upper surface 312. Lower surface 314 of base 310 resembles a series of living hinges which provide flexibility to base 310. Specifically, base 310 includes a series of ribs 316 which are generally parallel to each other and extend across the base 310 for providing longitudinal reinforcement to base 310. The portions of base 310 between adjacent ribs 316 are shown as relatively thin-walled sections 318 which act as the aforementioned series of living hinge of base 310. When base 310 serves as a bottom panel of a container, it is fully contemplated that a rigid portion be attached to the periphery of the base 310, to which any side walls or other container structure may be attached.

Accordingly, base 310 is a flexible platform or member which is adapted to conform generally to the natural shape of the banana bunch 300 or other produce or objects resting thereupon. Figure 39 illustrates the general mating of the base 310 and the objects 300. Such a base 310 supports bananas 300 and also allows for bananas 300 to be shipped "hands-up" referring to the banana bunch's natural shape, as illustrated in Figures 11 - 13. In the "hands-up" orientation, flexible base 310 may easily conform and mate with the natural shape of the bananas. In many cases, retailers often display bananas in the "hands-up" position. Therefore, these same retailers may desire that the bananas be shipped in the "hands-up" orientation in the container, which allows them to arrive display-ready. However, as represented by the embodiment of container 210, bananas may otherwise usually shipped in a "hands-down" orientation, resting on their tips 302 and crowns 304. Of course, as previously noted, flexible base 310 may equally be used to conform

with bananas 300 in their "hands-down" orientation, or any other orientation which may be achieved by objects positioned thereon.

Figure 14 illustrates the flexible base design incorporated into a second embodiment of a container 410, according to the present invention. Note that those components similar to the previous embodiments are designated by a like reference number with the addition of a "4" prefix. Figure 14 illustrates a transverse cross-sectional view of container 410, taken through a bunch of bananas 300. Container 410 includes base 412 having flexible bottom panel 414 and a relatively rigid portion 416 which extends around the periphery of bottom panel 414. Container 410 also includes side walls 428, 430, and end walls 432 having a handle 439. While the containers according to the present invention have been illustrated and disclosed as collapsible, the base designs according to the present invention may be used with any type of container to which the base may be incorporated feasibly.

Flexible base need not be incorporated into a container. Flexible base 310 of course may be used independent of a container, or may be applied to the side walls or bases of any number of containers in order achieve the goals and objects according to the present invention.

It is understood, of course, that while the forms of the invention herein shown and described include the best mode contemplated for carrying out the present invention, they are not intended to illustrate all possible forms thereof. It will also be understood that the words used are descriptive rather than limiting, and that various changes may be made without departing from the spirit or scope of the invention as claimed below.

What Is Claimed Is:

1. A flexible platform adapted to support an object, the flexible platform comprising:
a member having an upper surface upon which the object is supported,
5 and a lower surface having a plurality of parallel, spaced apart ribs with a relatively thin-walled section disposed between each adjacent pair of ribs to define a series of living hinges for allowing the platform to conform to the shape of the object.
2. A container adapted for storing and transporting an item having a shape, the container comprising:
10 a flexible bottom panel having an upper surface upon which the item is supported, and a lower surface having a plurality of parallel, spaced apart ribs with a relatively thin-walled section between each adjacent pair of ribs, the flexible bottom panel adapted to conform generally to the shape of the item resting thereon.
3. The container of claim 2, wherein the flexible bottom panel is
15 formed substantially of a plastic material.
4. The container of claim 3, further comprising a rigid portion extending around the periphery of the flexible bottom panel.
5. The container of claim 4, further comprising first and second pairs of opposed side walls each attached to the rigid portion.
- 20 6. The container of claim 5, wherein one of the first and second pairs of opposed side walls includes a plurality of recesses adapted to receive a palletizing strap therein.
7. The container of claim 4, wherein the rigid portion further includes a plurality of upstanding corner members each having a recess formed
25 therein, and wherein each of the first pair of opposed side walls has a lateral edge and a portion extending outwardly from the lateral edge and received within a

corresponding recess of the upstanding corner members, for enhancing the strength of the container.

8. A collapsible container adapted for holding therein at least one object having a shape, the collapsible container comprising:

5 a base having a flexible central portion with an upper surface upon which the at least one object is supported, and a lower surface having a plurality of parallel, spaced apart ribs with a relatively thin-walled section disposed between each adjacent pair of ribs to define a series of living hinges for allowing the platform to conform the shape of the at least one object, the base further including a rigid portion
10 extending around the periphery of the flexible central portion, the rigid portion having first and second pairs of opposed edges each including a plurality of lower hinge members;

a first pair of opposed side walls, each having a plurality of upper hinge members for pivotably mounting to a corresponding one of the plurality of
15 lower hinge members of the first pair of opposed edges; and

a second pair of opposed side walls releasably attached to the first pair of opposed side walls, each of the second pair of opposed side walls having a plurality of upper hinge members for pivotably mounting to a corresponding one of the plurality of lower hinge members of the second pair of opposed edges,

20 wherein the first and second pairs of opposed side walls are each movable between an assembled and a collapsed position.

9. The container of claim 8, wherein each of the first pair of side walls includes a relatively large central portion having a solid construction which extends outwardly beyond the plane defined by the corresponding side wall for
25 providing a more volume-efficient container.

10. The container of claim 8, wherein each of the first pair of opposed side walls includes a latch member disposed thereon for latching the first and second pairs of opposed side walls when oriented in the assembled position.

11. The container of claim 8, wherein each of the second pair of opposed side walls each includes a pair of opposed lateral flanges inwardly depending therefrom and integral therewith, each lateral flange having a latch receiver formed therein.

5 12. The container of claim 11, wherein the latch receiver includes an aperture and a flexible latch spring member and having a latch release member actuable by a user.

13. The collapsible container of claim 8, wherein the base is formed substantially of a plastic material.

10 14. A flexible platform adapted to support an object, the flexible platform comprising:

an upper surface upon which the object is supported, and a lower surface formed with a plurality of parallel spaced apart ribs, wherein the ribs are spaced to form sections between adjacent pairs of ribs to define a series of living
15 hinges for allowing the platform to conform generally to the shape of the object.

15. The flexible platform of claim 14, wherein the sections between the ribs have a relatively thin-walled cross-section.

16. A container arranged to store and transport a load, the container comprising:

20 a plurality of side walls and a bottom wall attached thereto, wherein at least one of the side and bottom walls comprises a unitary portion including an interior surface for engaging the load, and an exterior surface formed with a plurality of parallel ribs projecting therefrom which are spaced apart to define a flexible section between adjacent pairs of ribs such that the unitary portion is adapted to
25 conform generally to the load.

17. The container of claim 16, wherein the at least one of the side and bottom walls further comprises a relatively rigid peripheral portion extending around the unitary portion.

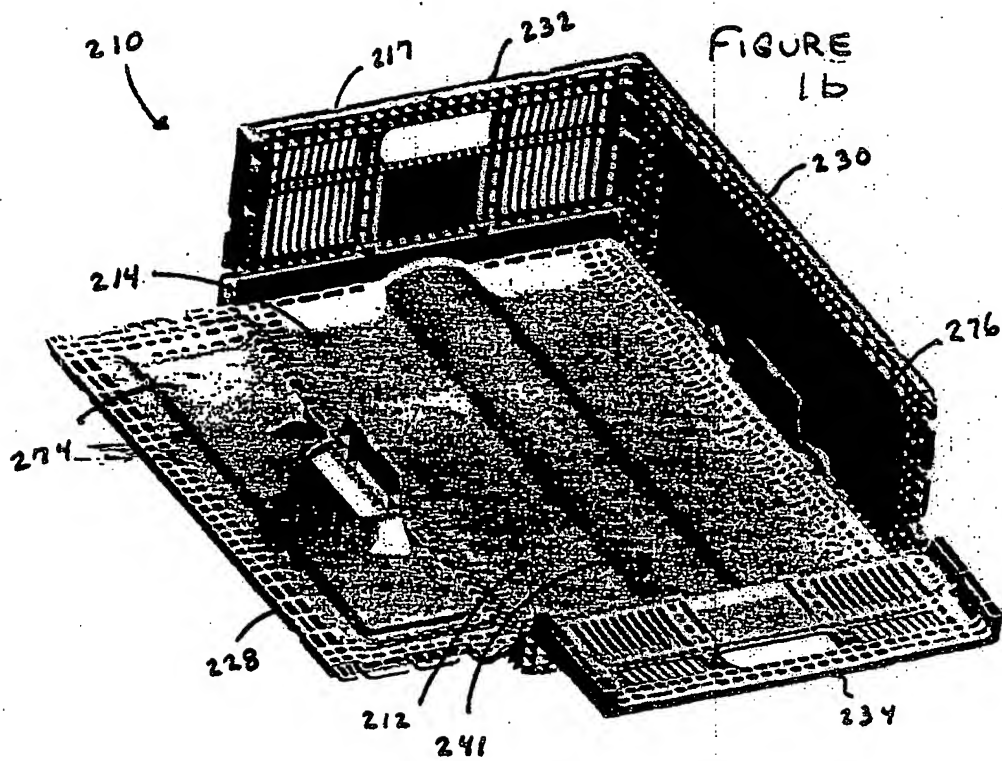
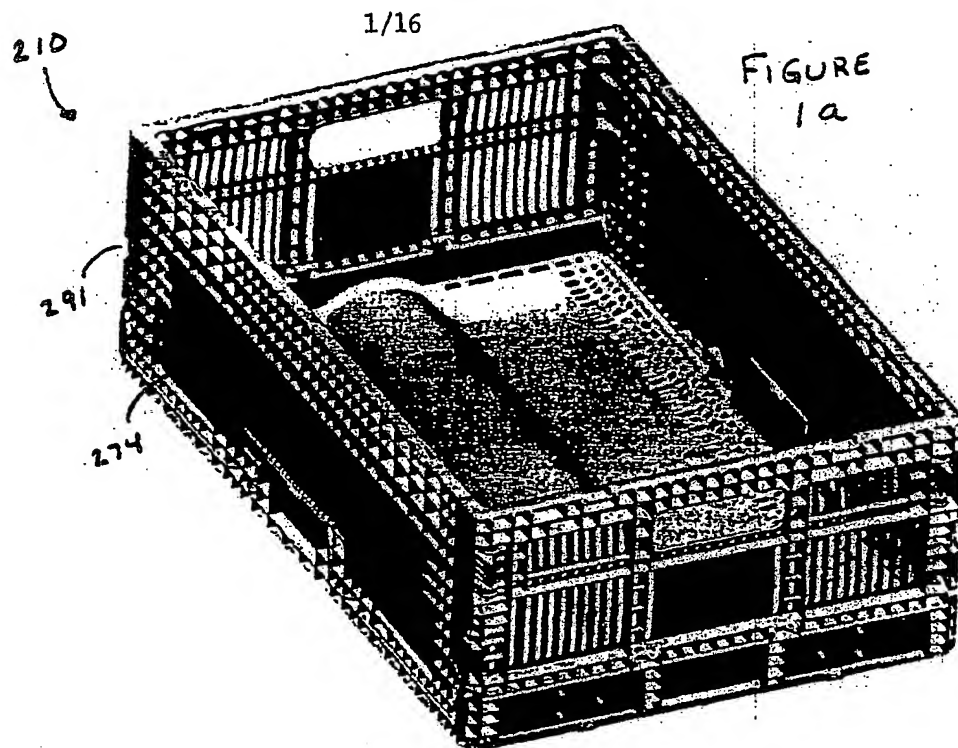
18. The container of claim 16, wherein the flexible section between
5 the ribs has a relatively thin-walled cross-section.

19. The container of claim 16, wherein the flexible section between the ribs forms a living hinge therebetween.

20. A container arranged to store and transport an object, the container comprising:

10 a base member including support portion upon which the object is supported and a frame extending around the periphery of the support portion, the support portion having a bottom surface and a top surface, the bottom surface having a plurality of ribs oriented generally parallel to each other and spaced apart from each other to define sections disposed between adjacent pairs of ribs forming living
15 hinges for allowing the base member to adapt generally to the object; and

a wall structure mounted to the base member and extending therefrom in a substantially upright orientation.



2/16

FIGURE 1C

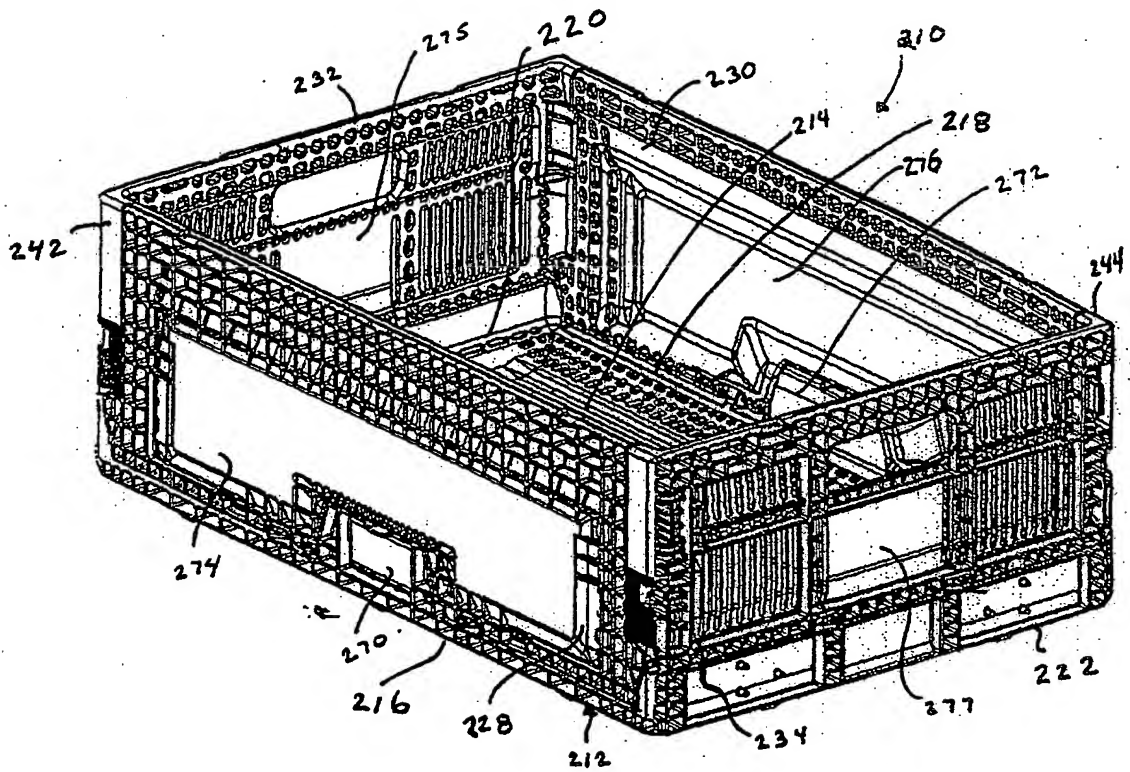


FIGURE 2

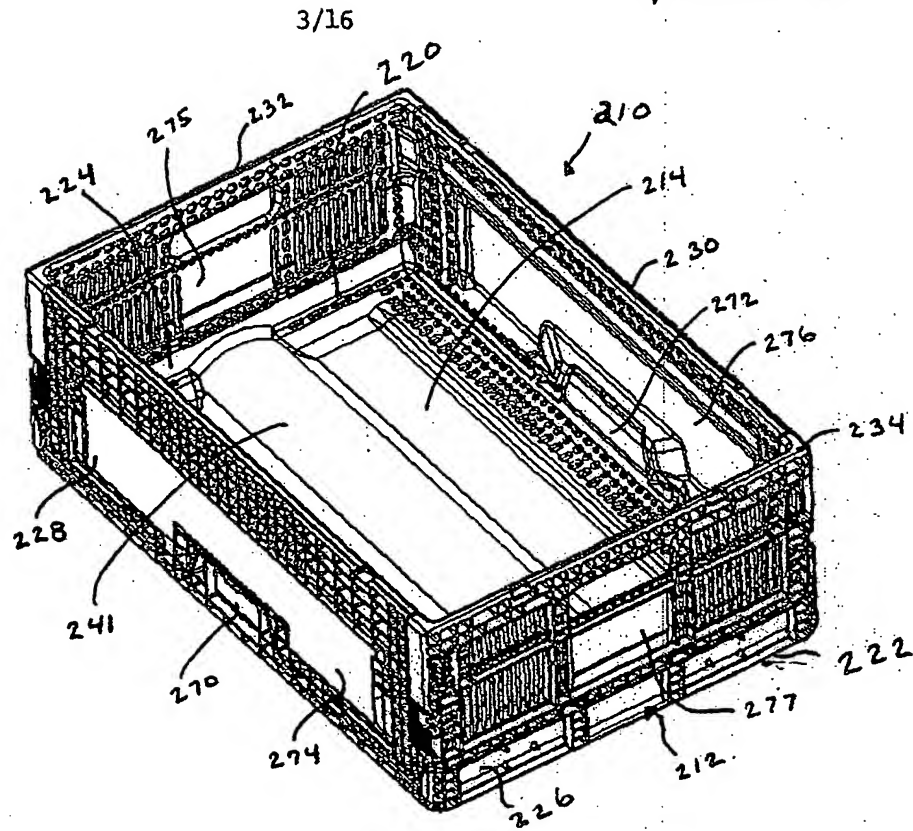


FIGURE 3

4/16

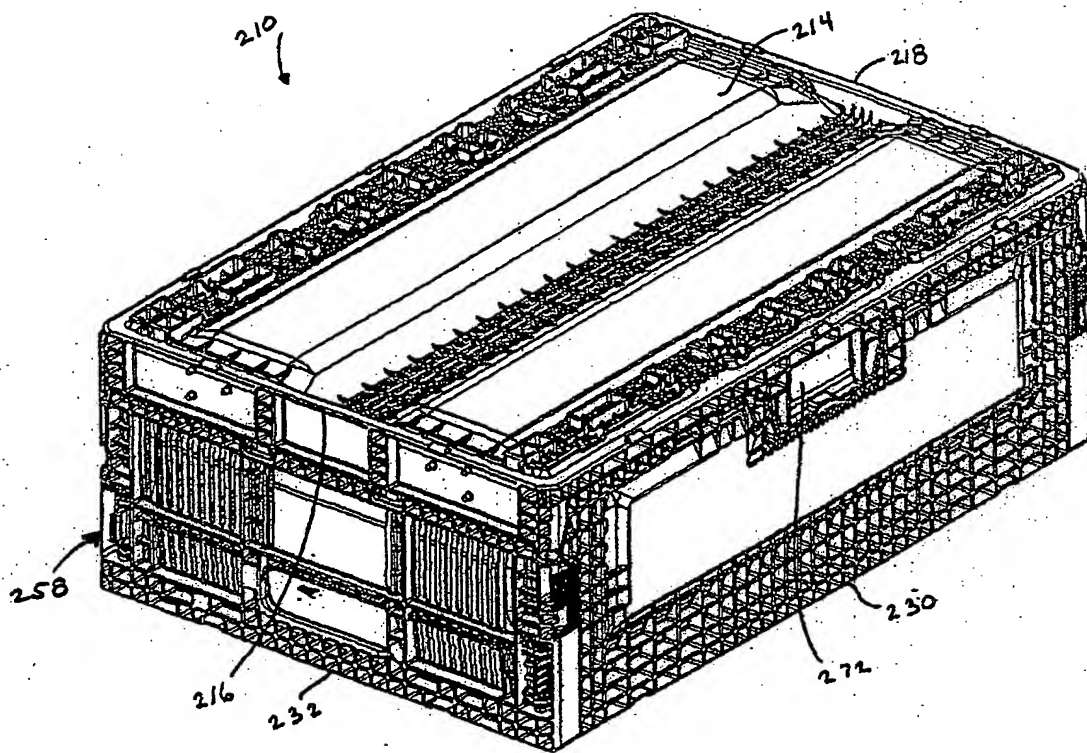
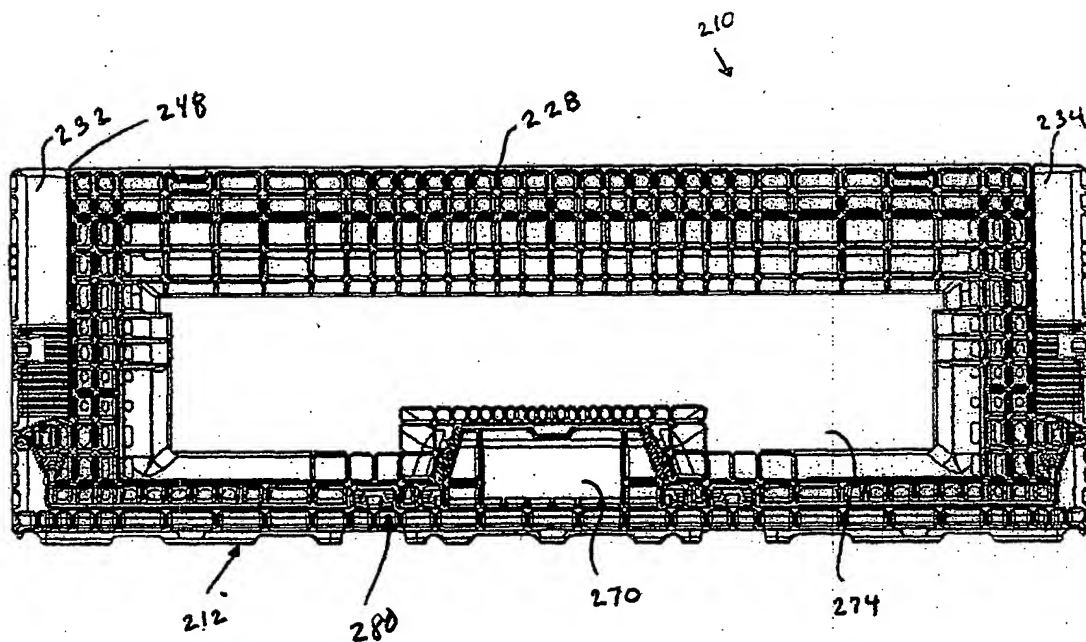


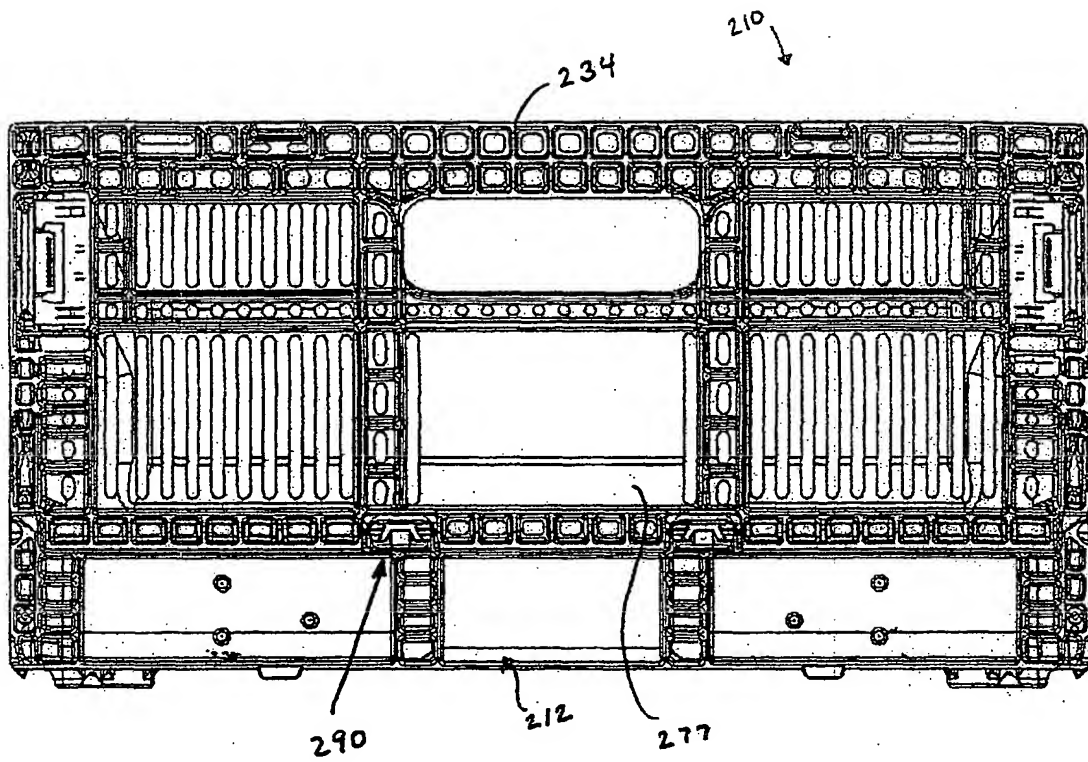
FIGURE 4

5/16

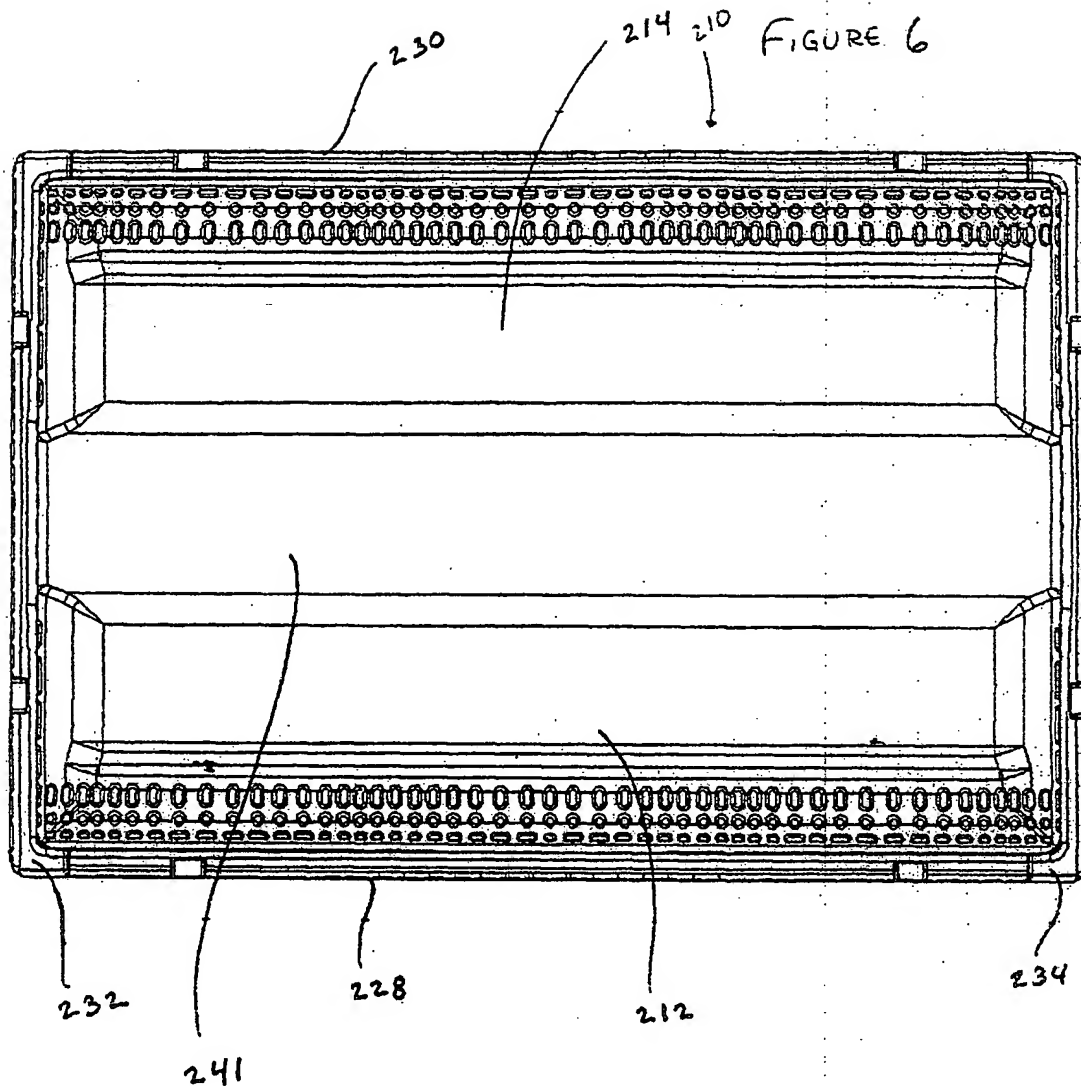


6/16

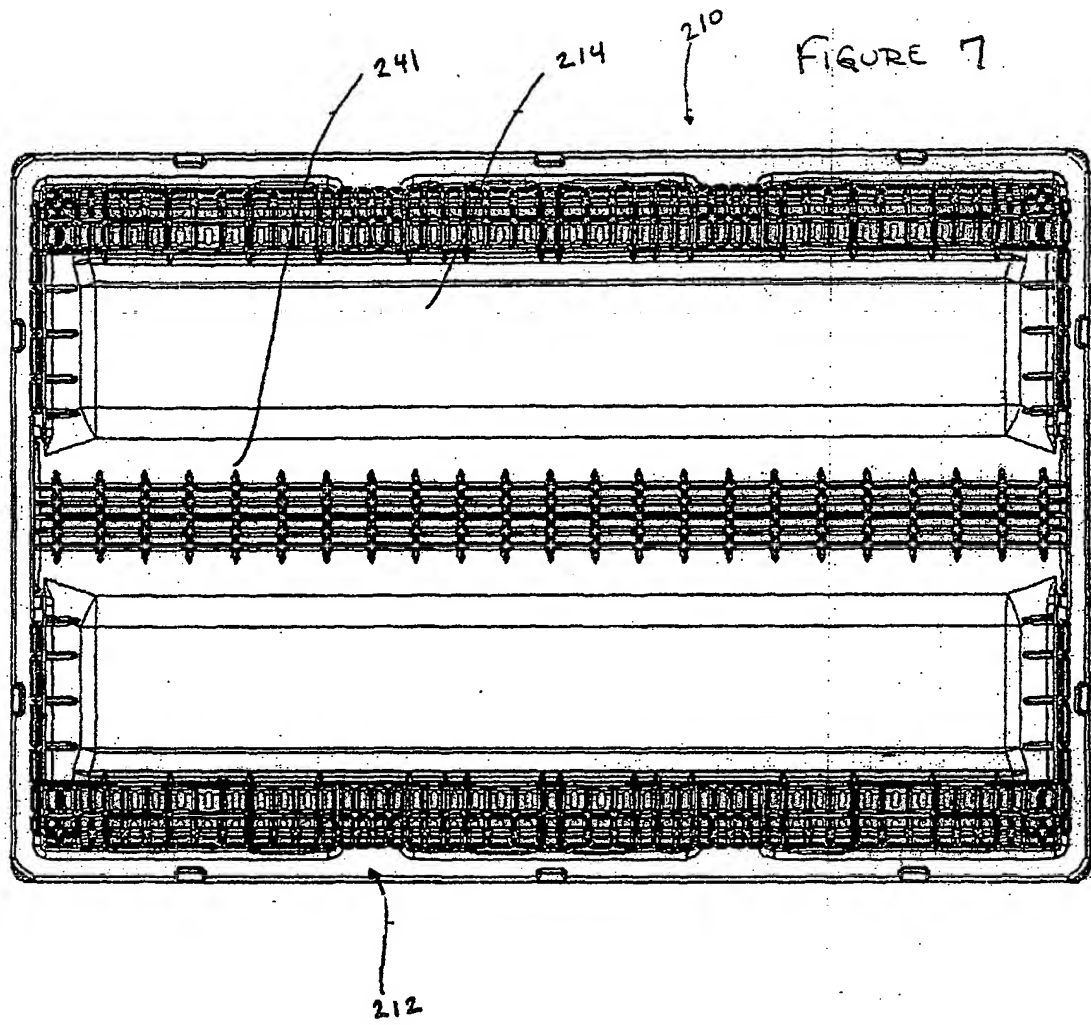
FIGURE 5



7/16

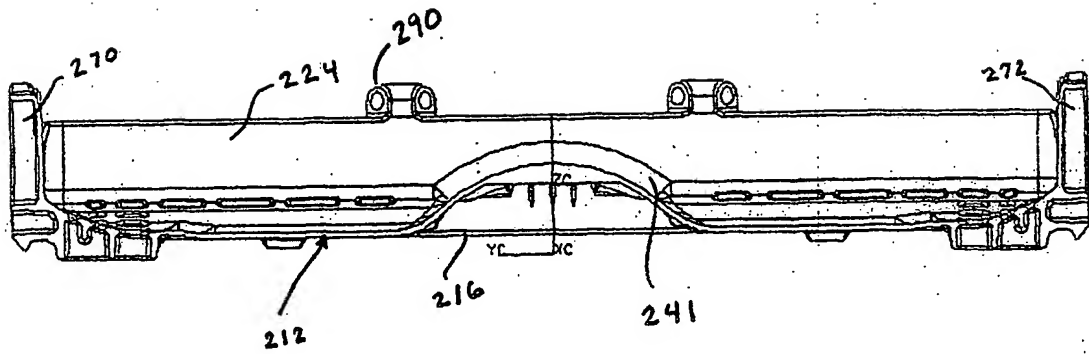


8/16



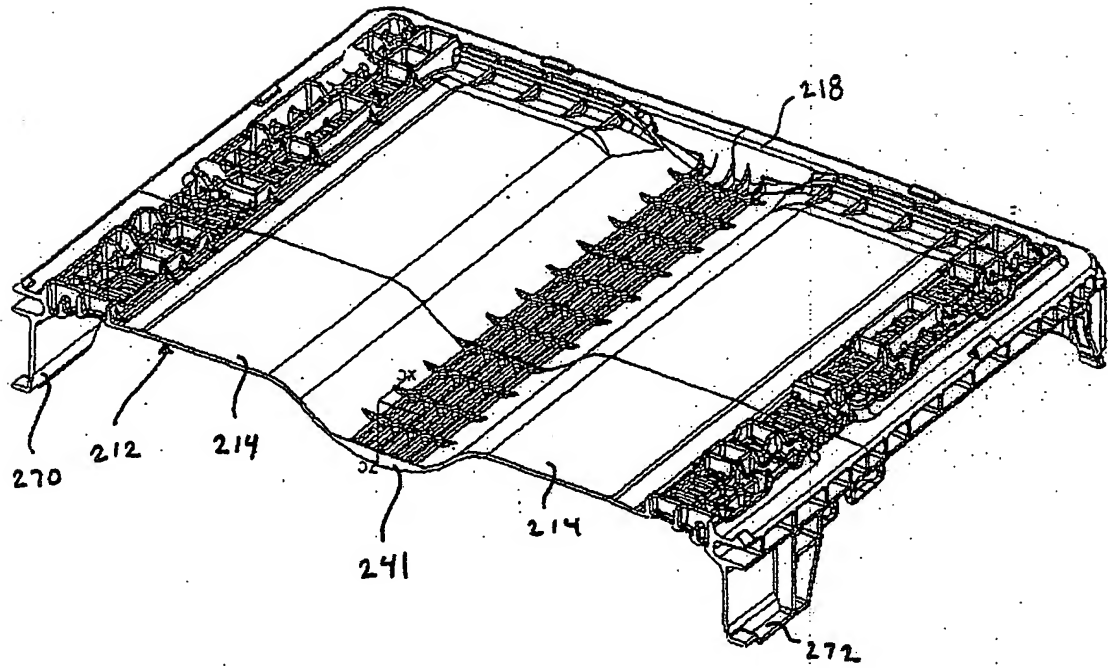
9/16

FIGURE 8



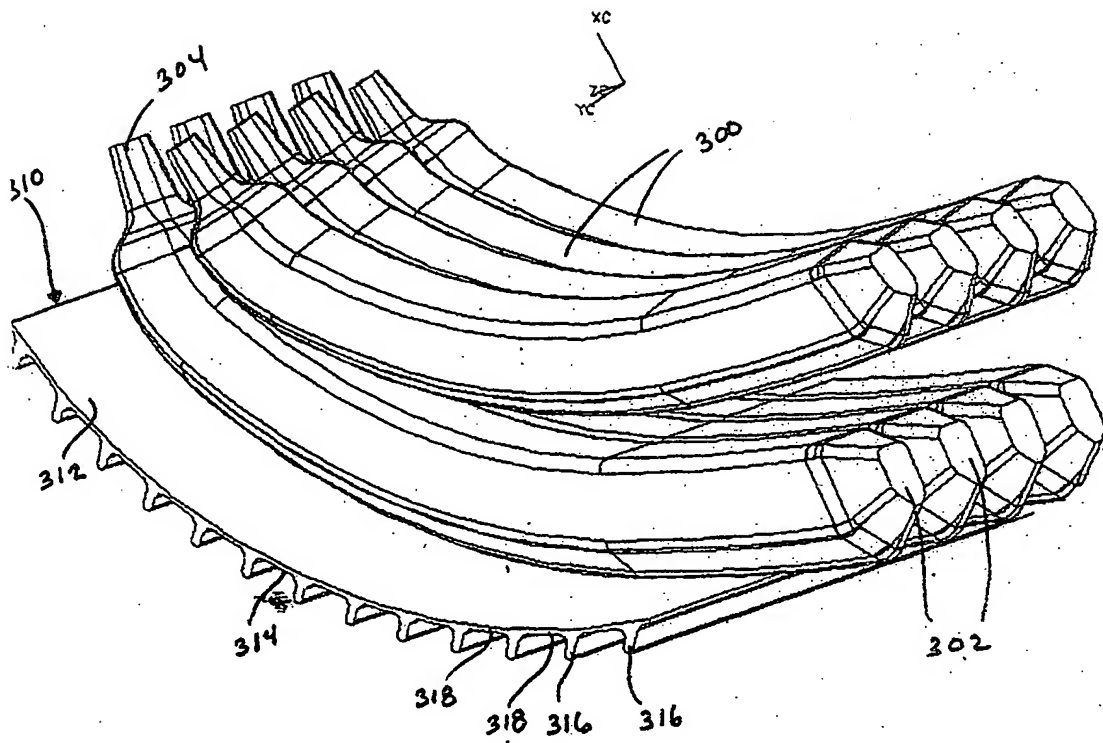
11/16

FIGURE 10



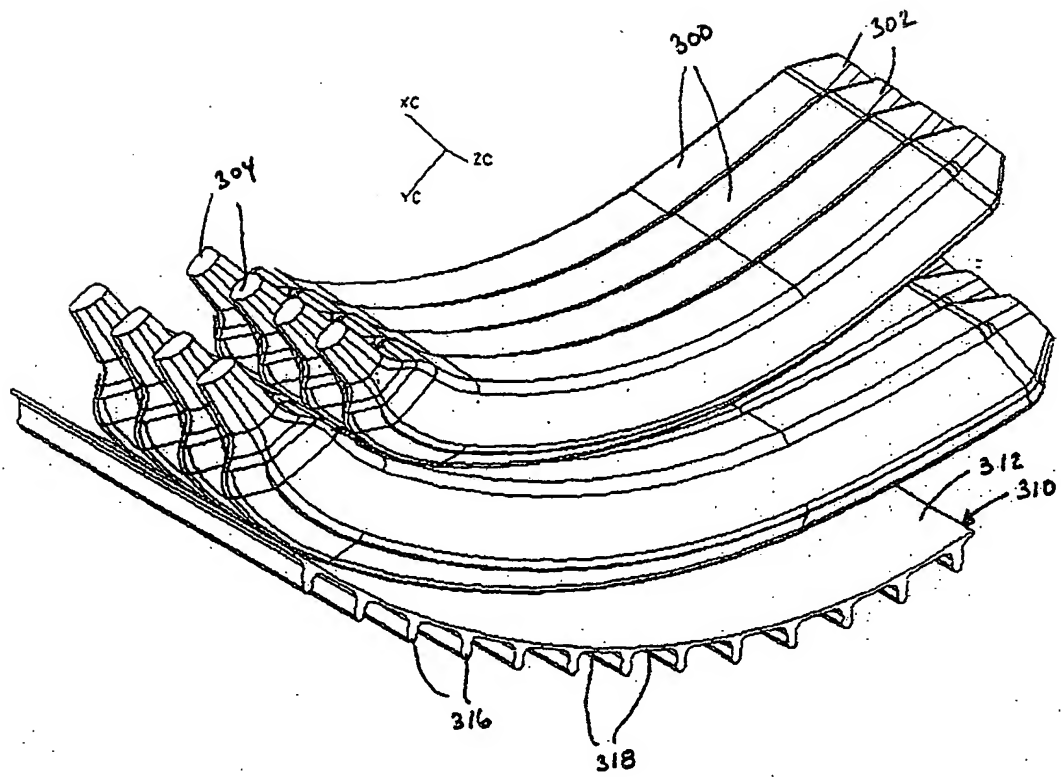
12/16

FIGURE 11



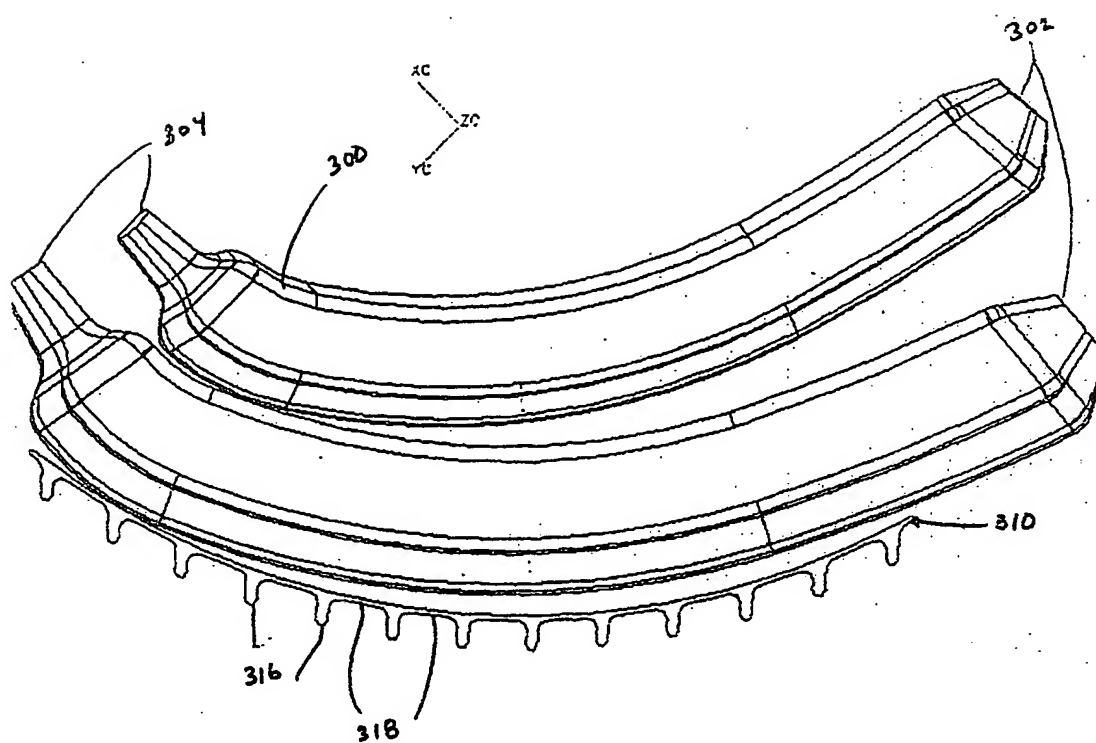
13/16

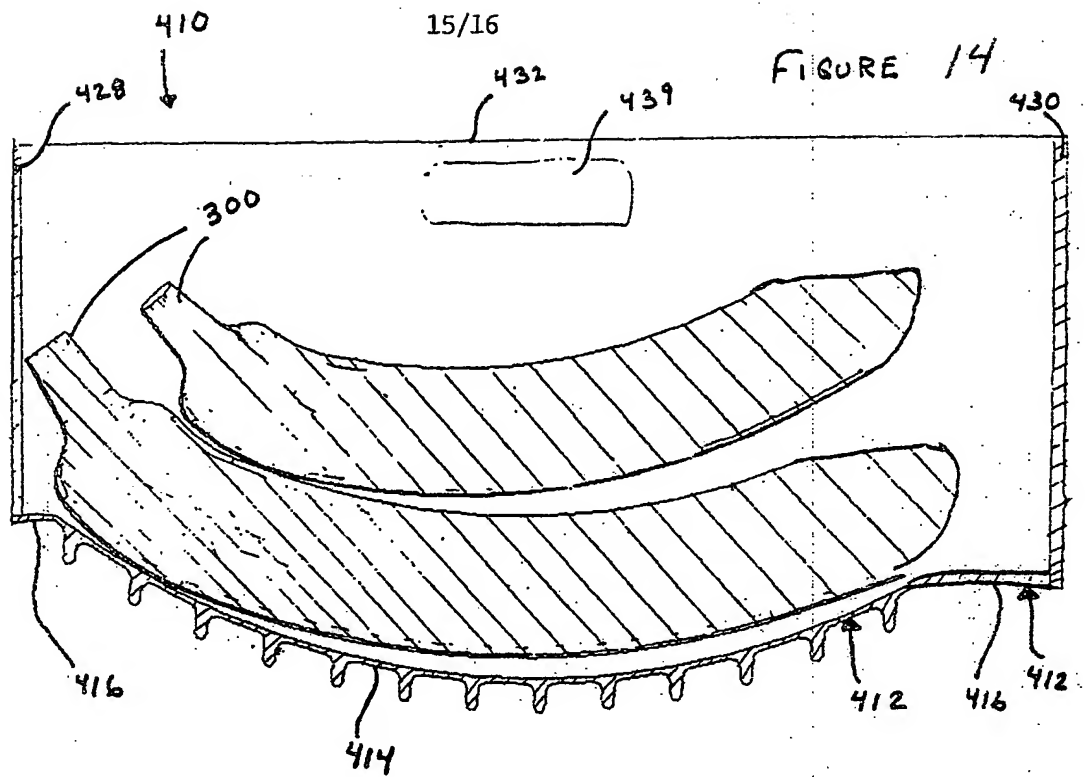
FIGURE 12



14/16

FIGURE 13





16/16

